UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/391,943	09/08/1999	NAGAAKI OHYAMA	990544/LH	9366

1933 7590 02/23/2005

FRISHAUF, HOLTZ, GOODMAN & CHICK, PC
767 THIRD AVENUE
25TH FLOOR
NEW YORK, NY 10017-2023

EXAMINER	
WHIPKEY, JASON T	

ART UNIT	PAPER NUMBER
2612	

DATE MAILED: 02/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/391,943	OHYAMA ET AL.	
	Examiner	Art Unit	
	Jason T. Whipkey	2612	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 December 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *40-69* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *40-69* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/7/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 7, 2004, has been entered.

Response to Amendment

2. All of the previous claims (1-39) have been cancelled. A rejection of new claims 40-69 follows.

Claim Objections

3. Claim 64 is objected to as failing to comply with 37 CFR 1.75(a) for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 64 recites the limitation "the image output apparatus" on line 5. There is insufficient antecedent basis for this limitation in the claim. For examination purposes, the claim will be treated as if it reads, "an image output apparatus".

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 40-50, 58, 59, and 63-69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ooyama (Japanese Patent Application Publication No. 09-172649) in view of Dandliker (U.S. Patent No. 3,922,093).

Regarding **claims 40 and 67**, Ooyama discloses an image processing apparatus (processor 30 in Drawing 1) for processing an image of an object taken by an image input apparatus (spectrum picture photography means 10), said image input apparatus comprising:

a reproducing environment converting unit (spectrum conversion means 30b) which combines a plurality of images of the object (page 4, lines 25-30, of

the previously provided machine translation) which are taken by the image input apparatus under a plurality of respective environments to convert the image of the object into an observation image according to an environment in which the observation image of the object is to be observed (see page 4, lines 40-43), based on: (i) photographing environment information acquired at a photographing time at which the object is photographed with the image input apparatus (light spectrum distribution means 20 on the photographing side of the system measures lighting data; see page 4, lines 25-30), and (ii) observing environment information acquired at an observing time at which the observation image of the object is observed (the system also detects the lighting spectrum on the reproduction side of the system; see page 5, lines 33-34).

Ooyama is silent with regard to detecting object feel-of-material information.

Dandliker discloses a system for measuring the roughness of a surface and captures:

object feel-of-material information regarding texture of the object (the number N is calculated, which is a direct measure of the roughness of the paper; see column 4, lines 3-8), said object feel-of-material information being acquired from the plurality of images of the object (see column 4, lines 32-34).

An advantage of measuring the feel of a surface is that a system can determine whether a bright spot on an object is the result of glossiness or an actual lightly colored area. For this reason, it would have been obvious at the time of invention to have Ooyama's system determine feel-of-material information about a subject.

Regarding **claim 41**, Dandliker teaches:

the object feel-of-material information includes light reflection information regarding reflection of light from the object (see column 3, lines 66-68).

Regarding **claim 42**, Dandliker teaches:

the light reflection information includes specular reflection information (see column 3, line 68, through column 4, line 2) regarding specular reflection at a surface of the object, said specular reflection varying in accordance with an angle of the light with respect to the surface of the object (the specular reflection is the result of glancing angle α; see column 2, lines 48-50).

Regarding **claim 43**, Dandliker teaches:

the light reflection information further includes diffuse reflection information regarding diffuse reflection at the surface of the object (as shown in Figure 4, TV camera 15 captures scattered light 26 in addition to reflected light 27; see column 3, line 64, through column 4, line 2).

Regarding **claim 44**, Dandliker teaches:

the light reflection information is acquired based on a geometrical relationship (see the angles of specular reflection α in Figure 1A; the operation of the embodiment in Figure 3 is the same as the embodiment in Figure 1A, as noted in column 3, line 50) between the image input apparatus (which receives the beam 1 in Figure 1A), the object (surface 8) and a light source (21) for illuminating the object at the photographing time (the measured light intensity I shown in diagram 23 is the result of light shining at angle α; see column 2, lines 51-66), and wherein

the geometrical relationship is determined based on the plurality of images (the light beam moves over time in order to produce diagram 23; see column 2, lines 60-66).

Regarding **claim 45**, Ooyama teaches:

the observing environment information includes light color information regarding a color of illuminating light emitted onto a place where the observation image of the object is observed at the observing time (see page 5, lines 33-35).

Regarding **claim 46**, Ooyama teaches:

the photographing environment information includes light color information regarding a color of illuminating light emitted onto the object at the photographing time (see page 5, lines 27-32).

Regarding **claim 47**, Ooyama teaches:

the photographing environment information includes light spectrum information regarding a spectrum of illuminating light emitted onto the object at the photographing time (see page 5, lines 27-32);

the observing environment information includes light spectrum information regarding a spectrum of illuminating light emitted onto a place where the observation image of the object is observed at the observing time (see page 5, lines 33-35); and

the reproducing environment converting unit converts the image of the object based on a difference between the spectrum of the illuminating light emitted onto the object at the photographing time and the spectrum of the

illuminating light emitted onto the place where the observation image of the object is observed at the observing time (see page 5, lines 36-41).

Regarding **claim 48**, Ooyama teaches:

the photographing environment information includes light spectrum information regarding a spectrum of the illuminating light (see page 5, lines 27-32).

Regarding **claim 49**, Ooyama teaches:

the photographing environment information includes at least one of: (i) object form information regarding a form of the object, (ii) object color information regarding a color of the object (image data of the subject is captured in color to be reproduced in color; see page 6, lines 44-46), (iii) object direction information regarding a direction of the object with respect to the image input apparatus, and (iv) object position information regarding a position of the object with respect to the image input apparatus.

Regarding **claim 50**, Ooyama teaches:

the observing environment information includes light spectrum information regarding a spectrum of the illuminating light (see page 5, lines 33-35).

Regarding **claim 58**, Ooyama teaches that the image is captured by a single multi-spectrum camera (see page 6, lines 18-19).

Regarding **claim 59**, Ooyama teaches:

the observing environment information is information regarding an environment in which the observation image of the object output from the image output apparatus is observed (see page 5, lines 33-35).

Regarding **claim 63**, Ooyama teaches:

the reproducing environment converting unit comprises an image interpolating and composing unit (interpolator 32 and spectrum memory 33) for combining the plurality of images (interpolator 32 outputs data to spectrum memory 33, which collects the data; see page 7, lines 37-39).

Regarding **claim 64**, Ooyama teaches:

the photographing environment information includes information regarding the image input apparatus, and the observing environment information includes information regarding the image output apparatus (image processing occurs by converting the color spaces used by the camera to the color space used by the display; see page 13, lines 7-17).

Regarding **claims 65 and 68**, Ooyama discloses an image processing apparatus (processor 30 in Drawing 1) for processing an image of an object taken by an image input apparatus (spectrum picture photography means 10), said image processing apparatus comprising:

a reproducing environment variable image data producing unit (spectrum conversion means 30b) which combines a plurality of images of the object (page 4, lines 25-30, of the previously provided machine translation) taken under a respective plurality of environments to produce reproducing environment variable

image data based on photographing environment information acquired at a photographing time at which the object is photographed by the image input apparatus (light spectrum distribution means 20 on the photographing side of the system measures lighting data; see page 4, lines 25-30).

Ooyama is silent with regard to detecting object feel-of-material information.

Dandliker discloses a system for measuring the roughness of a surface and captures:

object feel-of-material information regarding a texture of the object (the number N is calculated, which is a direct measure of the roughness of the paper; see column 4, lines 3-8), said object feel-of-material information being acquired from the plurality of images of the object (see column 4, lines 32-34).

An advantage of measuring the feel of a surface is that a system can determine whether a bright spot on an object is the result of glossiness or an actual lightly colored area. For this reason, it would have been obvious at the time of invention to have Ooyama's system determine feel-of-material information about a subject.

Regarding **claims 66 and 69**, Ooyama discloses:

a reproducing environment converting unit (spectrum conversion means 30b) which converts the reproducing environment variable image data into an observation image in accordance with an environment in which the observation image of the object is observed (see page 4, lines 40-43), by applying observing environment information acquired at an observing time at which the observation image is to the reproducing environment variable image data (see page 5, lines 33-35).

7. Claims 51 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ooyama in view of Dandliker and further in view of Minami (U.S. Patent No. 6,014,472).

Claim 51 may be treated like claim 50. However, Ooyama and Dandliker are both silent with regard to including at least one of an observation illuminating light position converting unit and an observation illuminating light form converting unit.

Minami discloses an image processing device, including:

> an observation illuminating light position converting unit (shadow signal producing section 20) which converts the plurality of images (a video signal is processed; see column 4, lines 21-22) into images which are adapted to be respectively acquired when the at least one light source for illuminating the object in the image is moved to an arbitrary position at the observing time (the operator selects a position for a light source, resulting in the generation of an appropriate shadow; see column 30, line 46, through column 31, line 28).

An advantage of producing a video signal with an object relocated to a desired position with respect to a light source is that the position of the object may be improved without the expense of re-shooting the scene. For this reason, it would have been obvious at the time of invention to have Ooyama's system include the virtual light positioning system described by Minami.

Claim 52 may be treated like claim 40. However, Ooyama and Dandliker are both silent with regard to the observing environment information including at least one of object position information, object direction information, and observer position information.

Minami discloses an image processing device for setting observing environment parameters, including:

> object position information (the operator selects a position for a subject, resulting in the generation of an appropriate shadow; see column 30, line 46, through column 31, line 28) regarding a position of the object in the observation image.

An advantage of producing a video signal with an operator-specified position a subject is that the position of the subject may be improved without the expense of re-shooting the scene. For this reason, it would have been obvious at the time of invention to have Ooyama's system include the virtual light positioning system described by Minami.

8. Claim 53 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ooyama in view of Dandliker and Minami and further in view of Katayama (U.S. Patent No. 6,256,035).

Claim 53 may be treated like claim 52. However, Minami is silent with regard to including at least one of an object moving unit, an object rotating unit, and an observation position converting unit.

Katayama discloses an imaging system that includes:

> an object moving unit (CPU 102) which converts the plurality of images (images are captured by camera 803) into images which are adapted to be respectively acquired when the object in the image is directed in an arbitrary direction, based on the object position information (the user may enter a point at

which to place the "virtual camera,", thus changing the viewer's observation direction of the object; see column 5, lines 16-35).

An advantage of producing a video signal of an object relocated at a desired position is that the viewer may obtain information upon demand about an object. A viewer can therefore gain a more accurate impression of the object. For this reason, it would have been obvious at the time of invention to have Ooyama's system include the virtual camera positioning system described by Katayama.

9. Claims 54 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ooyama in view of Dandliker and further in view of Cabral (U.S. Patent No. 6,697,062).

Claim 54 may be treated like claim 40. Additionally, Ooyama discloses:

a reproduction environment variable image data producing unit (computing element 35) which produces reproduction environment variable image data from the image of the object taken by the image input apparatus by using the photographing environment information (calculations on the image data are performed based on the lighting detected on the photographing side of the system; see page 9, lines 22-28); and

a data transmitting apparatus (communication interface equipment 40 and 45 in Drawing 3) which transmits the reproduction environment variable image data to the reproducing environment converting unit through one of a portable recording medium and a network (via the communication line shown in Drawing 3).

Ooyama is silent with regard to producing reproduction environment variable image data from object feel-of-material information.

Cabral discloses an image rendering system that uses a map of an object including the object's texture to produce a three-dimensional reproduction of the object (see column 6, lines 58-62, and column 7, lines 50-55).

An advantage to rendering an image using stored feel-of-material information is that a more realistic image may be produced when the image's lighting is varied. For this reason, it would have been obvious at the time of invention to have Ooyama's system use object feel-of-material information in performing a reproduction.

Regarding **claim 55**, Ooyama discloses:

> the reproducing environment converting unit converts the transmitted reproduction environment variable image data into the observation image (see page 9, lines 22-28).

10. Claims 56 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ooyama in view of Dandliker and further in view of Jones (U.S. Patent No. 3,564,988).

Claim 56 may be treated like claim 40. However, Ooyama and Dandliker are both silent with regard to including a turntable.

Jones discloses a device for three-dimensional photography (see Figure 1), wherein:

> the image input apparatus controls a turntable for rotating the object at a desired angle (turntable 60 is rotated under control of the camera; see column 1, line 74, through column 2, line 7), and picks up the plurality of images of the object at a plurality of angles (see column 3, lines 8-13).

As stated in column 1, lines 54-59, an advantage to using a turntable is that the subject can be captured at a variety of angles. For this reason, it would have been obvious at the time of invention to have Ooyama's system include a turntable, such as the one described by Dandliker.

Regarding **claim 57**, Jones teaches that turntable 60 may be both rotated and tilted relative to camera assembly 10 (see column 3, lines 44-45).

11. Claims 60 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ooyama in view of Dandliker and further in view of Ishibashi (U.S. Patent No. 6,215,461).

Claim 60 may be treated like claim 59. However, Ooyama and Dandliker are both silent with regard to including a head-mounted display.

As shown in Figure 1, Ishibashi discloses:

> a head mounted display (2) which is adapted to display at least one of a stereoscopic observation image of the object (see column 3, lines 14-24) and a holographic observation image of the object.

An advantage of using a head-mounted display is that a more realistic image can be provided to a viewer. For this reason, it would have been obvious at the time of invention to have Ooyama's system include a head-mounted display, such as the one described by Ishibashi.

Regarding **claim 61**, Ishibashi teaches:

> the head mounted display comprises a gyroscopic sensor (405 and 406) which detects a change of the observing environment information (see column 4, lines 3-5), and which changes the displayed observation image in accordance with movement of the head mounted display (the gyroscopes detect the movement of the user's head and move camera 1 accordingly; see column 4, lines 48-54).

12. Claim 62 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ooyama in view of Dandliker and further in view of Wright (U.S. Patent No 4,757,379).

Claim 62 may be treated like claim 40. Additionally, Ooyama teaches that the image input device is programmed to rotate filter 2 while capturing a plurality of images (see page 7, lines 27-43). However, Ooyama is silent with regard to illuminating the plurality of images at different angles by an arbitrarily movable illumination source.

Wright discloses an apparatus and method for acquisition of 3D images (see Figure 4), including:

> wherein when the plurality of images are picked up (two image scans occur; see column 5, lines 36-38), the object is illuminated at different angles by a source of illumination (light sources L1 and L2 are used in successive scans; see column 5, lines 40-42) for illuminating the object on a photographing side, said source of illumination being arbitrarily movable (see column 5, lines 38-40).

An advantage of moving an illumination source to an arbitrary point is that shadows may be reduced in complex objects. For this reason, it would have been obvious at the time of invention to have Ooyama's system include an arbitrarily movable illumination source.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Whipkey, whose telephone number is (703) 305-1819 or (571) 272-7321 beginning March 1, 2005. The examiner can normally be reached Monday through Friday from 8:30 A.M. to 6:00 P.M. eastern standard time, alternating Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wendy Garber, can be reached at (703) 305-4929. The fax phone number for the organization where this application is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JTW

JTW
February 18, 2005

WENDY R. GARBER
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600